

REMARKS

Claims 1-24 and 25-29 and newly added Claims 30-36 are active in the case. Claims 5-7 and 12-22 stand withdrawn from consideration. Reconsideration is respectfully requested.

Applicants' representative wishes to thank Examiner Choi for the helpful and courteous interview of August 6, 2003. As a result of the discussion it is believed that the issues have been clarified and that the prosecution of the application has been materially advanced.

The present invention relates to a magnesium carrier for olefin polymerization catalysts.

Claim Amendments

Claims 1, 4, 8, 11, 25, 26 and 29 have been amended to recite that the magnesium compound product of the invention is essentially a magnesium dialkoxide compound. The essential dialkoxide composition of the compound is evident from the fact that the reactant combination employed to form the compound is magnesium metal, a hydrocarbyl alcohol and a halogen or the halogen that is part of a halogen-containing metal compound. As evident from the very low ratio of halogen reactant to gram atom of magnesium, the halogen content of the essentially magnesium dialkoxide product is very low. Moreover, it is evident from the disclosure on page 10, first full paragraph of the specification that sufficient alcohol is present in the reaction medium to form the compound because the minimum amount of

alcohol is at least two moles of the alcohol per gram atom of magnesium. Accordingly, the amendment made to the indicated claims is believed supported and entry of the same is respectfully requested.

Newly added Claims 30 and 33 are supported by the disclosure of the text on pages 10 and 11. Newly added Claims 31 and 34 are supported by Examples I-1, 2, 5 and 6 on page 39 of the text, while new Claims 32 and 35 are supported by Examples I-4 and 5 on page 39 of the text. New Claim 36 is a combination of Claims 1, 4, 30 and 32 and page 15, lines 3-12 of the specification. Entry of the new claims is respectfully requested.

Invention

An aspect of the invention is directed to a magnesium compound that substantially comprises a magnesium dialkoxide prepared by reacting metallic magnesium, an alcohol and at least 0.0001 gram atoms, in terms of halogen atoms relative to one gram atom of magnesium, of a halogen and/or a halogen-containing metal compound, at 30° to 60° C.

Other aspects of the invention specify that the sphericity of the magnesium compound particles is less than 2.0, the mean particle size ranges from 38 to 60 μm , the particle size distribution of the magnesium compound particles is less than 4.0 and ratio of halogen or the halogen of a halogen containing compound to one gram atom of magnesium ranges from 0.0001 to 0.06.

Prior Art Rejection

Claims 4 and 11 stand rejected based on 35 USC 102(b) or 35 USC 103(a) as anticipated by or rendered obvious over Murata et al, U. S. Patent 4,960,743. This ground of rejection is respectfully requested.

The Murata et al patent discloses a method of producing a carrier for the polymerization of olefins by reacting magnesium metal with a halogenated hydrocarbon, a compound of the formula: $X_n^1M(OR^1)_{m-n}$ and a halogen-containing alcohol. The product of this reaction is a halogenated magnesium oxide which is primarily distinguished from the claimed compound of the invention because of its much higher halogen content. Example 1 of the reference describes a mixture of n-butyl chloride in n-hexane that is added to a mixture of preactivated magnesium metal, ethyl orthoformate and iodine as a promoter whereby a solid reaction product is obtained. Further reaction work-up results in a white powdery solid. Then 2,2,2-trichloroethanol in n-hexane was added to the powder and the combination was reacted at 80° C for 1 hour. A carrier material was then obtained upon further work-up. Using this basic procedure the examples of the reference show chlorine contents ranging from 24.0 to 67.7 %, mean particle sizes of the magnesium compound ranging from 7 to 31 μm and a particle size distribution ranging from 0.31 to 0.52.

By contrast the magnesium compound product is substantially different because it is substantially magnesium dialkoxide as noted for the reasons stated above. The amount of halogen in the present product is very small, as is particularly evident from newly submitted Claims 30 and 33 where the content of halogen to magnesium ranges from 0.0001-0.06 gram

atom and 0.0005-0.06 gram atom of halogen per one gram atom of magnesium in contrast to the products of the examples of Murata et al which range from about 24 to 67 %. Further, the mean particle size of the product of the invention is about 38-60 μm whereas the particle size of the product of Murata et al ranges from 7-31 μm , and the particle size distribution of the present magnesium compound ranges from about 3.4 to 4.8 which is a greater range than the particle size distribution range of 0.31-0.52 of Murata et al.

It is also clear from the language of the present claims and the disclosure of Murata et al that the present process of producing the claimed magnesium compound is materially simpler than that of Murata et al which employs the $X_n^1M(OR^1)_{m-n}$ compound and a halogen-containing alcohol, neither of which is used in the present process. Moreover, it is noted that whereas in the reaction of materials that produce the product of the present invention, the reaction is conducted at 30 to 60° C while the reaction of Murata et al is conducted at -20 to 150° C. In Example 1 of the reference the reaction is conducted at 80° C.

Applicants submit that Murata et al neither anticipates nor obviates the invention as claimed in Claim 36 which defines the claimed magnesium compound with respect to several of the physical characteristics discussed above as well as by the halogen content range of 0.0001 to 0.06 gram atom per one gram atom of magnesium. Withdrawal of the rejection over Murata et al is respectfully requested.

Claims 1-3, 8-10 and 23-29 stand rejected based on 35 USC 103(a) as obvious over Murata et al, U. S. Patent 4,960,743 or Mehta et al, U. S. Patent 4,820,672. This ground of rejection is respectfully requested.

Applicants submit that the claimed invention is not obvious in view of the disclosure of Murata et al for the reasons advanced above.

As to Mehta et al, the patent discloses a magnesium based support, which is a magnesium halide alcohol complex, for an olefin polymerization catalyst. As described in column 3, lines 18-30 of the patent, the magnesium product is prepared by reacting magnesium metal or a magnesium compound with an anhydrous hydrogen halide or an alkyl halide and a chlorosubstituted alcohol in an ether free hydrocarbon. This procedure stands in contrast to the synthesis of the present invention in which magnesium metal is reacted with a hydrocarbyl alcohol and at least 0.0001 gram atom, in terms of halogen atoms relative to one gram atom of magnesium, of a halogen and/or a halogen-containing metal compound. (In new Claim 36 the amount of amount of halogen reacted with magnesium is 0.0001 to 0.06 gram atom of halogen per gram atom of magnesium.) In Example 2 of Mehta n-butylchloride is added to a heated mixture of magnesium, n-heptane and a few crystals of iodine at reflux temperature. Anhydrous hydrogen chloride is bubbled into the mixture and butane is released. Thereafter, 2-methyl-1-pentanol is added to the slurry to obtain the desired magnesium halide alcohol complex. Analysis of the product indicates that it has a molar amount of magnesium of 0.73 moles and contained essentially no base. Thus, the product is essentially magnesium chloride containing some chloride. The product is clearly not a magnesium dialkoxide because magnesium dialkoxide is a weak base. The average particle size of the product is 8-12 μm as determined by a scanning electron microscope which is different from the claimed range of particle size for the present product of 38-60 μm ..

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Clearly, the essentially magnesium dialkoxide of the present invention that contains very little halide is quite different from what essentially is a magnesium dihalide of the reference. Accordingly, Mehta et al does not anticipate or obviate the invention as claimed and withdrawal of the rejection based on the patent is respectfully requested.

It is now believed that the application is in proper condition for allowance. Early notice to this effect earnestly solicited.

Respectfully submitted,

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